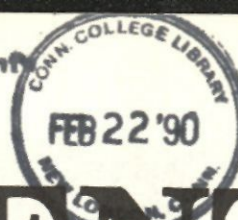


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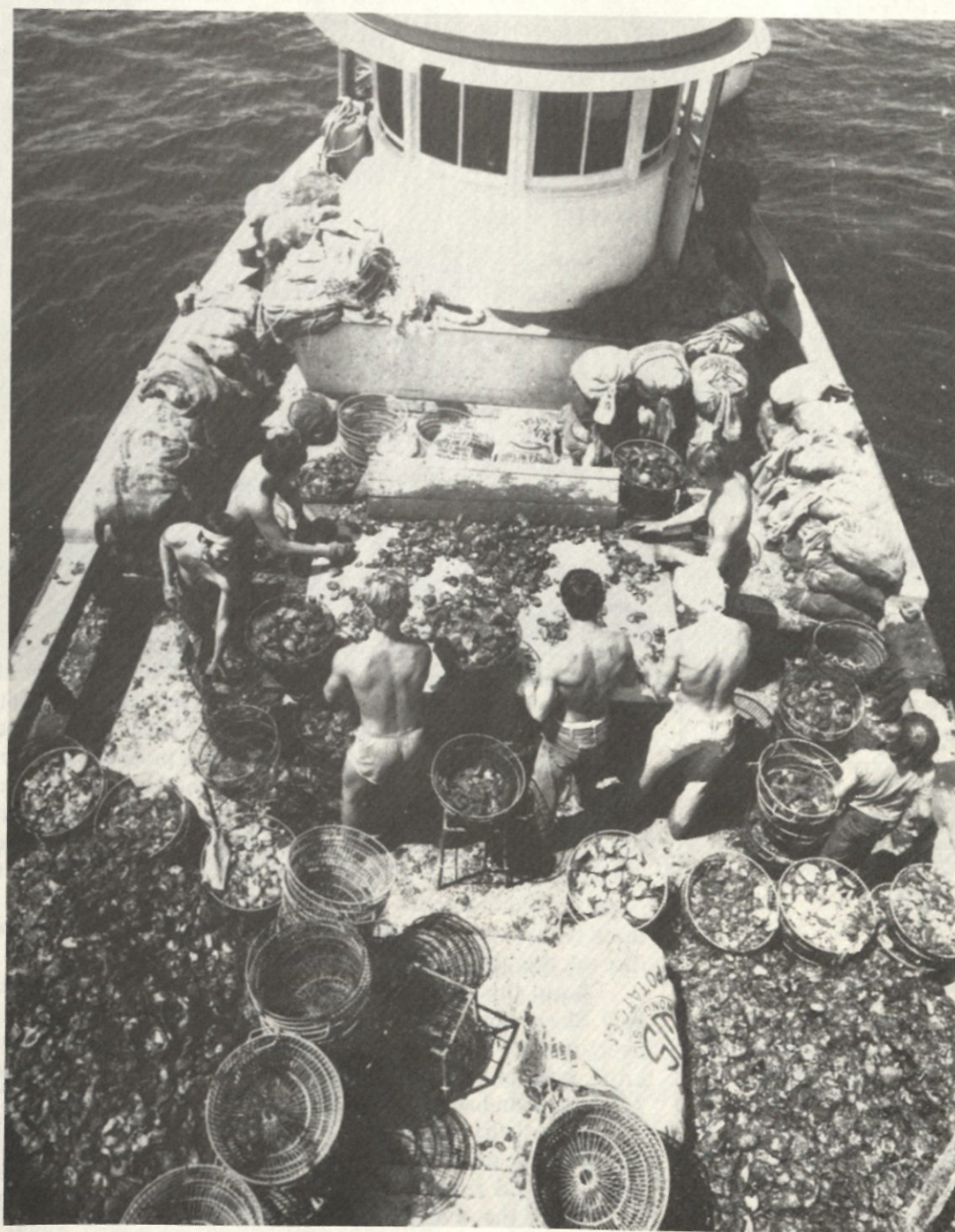


CONNECTICUT

# ENVIRONMENT



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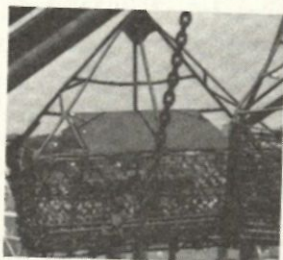


Connecticut's Shellfishing Industries  
January/1990



# CONNECTICUT ENVIRONMENT

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## Editor's Note

One of the recurring themes in this little magazine of ours is respect -- respect for the air, respect for the water, respect for the land, respect for our fellow creatures, respect for our fellow man. People who think and act environmentally do so with respect. It is probably not too far off the mark to say that the mission of environmentalists is to encourage respect. Certainly the Native American view of the world, with its careful, sacred relationship between humans and every bird in the sky, is based on respect.

Recently I heard a little story which raised my understanding of respect to another level. I heard it in a non-environmental context, but I think it's appropriate to share it here. Since I heard it, things became more focused; the idea of respect became more fine-tuned.

I heard this story from a very lovely, profound, maybe even angelic lady. She spoke of a man she knew who received large amounts of mail. Every day, he would carefully, precisely, open each envelope with a letter knife, read the letter, fold it back up, and return it to its proper envelope. After the man had gone through the day's mail, this lady said, you almost couldn't tell that the mail had been opened at all. This was because, the lady said, the man treated his mail, and everything else, with the deepest, most complete respect.

I think that everyone who is concerned with the kind of world we will leave our children must strive for this level of respect. Not only must we respect the air, the water, the land; we must respect everything.

So, with deep respect for our readers, for the people who help put out this magazine, for the mission of all environmentalists, and for the ink on this page, we offer our January 1990 issue of *Connecticut Environment*. Happy New Year.

R.P.





Oysters from Long Island Sound are of the highest quality. They are high in vitamins and minerals and low in cholesterol and calories. (All photos courtesy of Talmadge Brothers, Inc., of Norwalk)

# Shellfishing in Connecticut

by  
Robert Schneiders  
Environmental Intern

ONE OF CONNECTICUT'S OLDEST and least conspicuous industries is shellfishing. Long before white men set foot in North America, Connecticut Indians relied on the tasty little mollusks as a food source. Indian burial sites in the Branford area have shown circles of live oysters around tombs, indicating the significance of oysters in rituals.

The waters along Connecticut's coast provide excellent conditions for oyster growth and cultivation. With an average salinity of 27 to 28 parts per thousand, temperatures between 32 and 78 degrees F., and a coastline composed of shallow bays, creeks, and brackish estuaries,

Long Island Sound is an ideal habitat.

Of the more than 100 species of oysters worldwide, none is more prized for its food value than Connecticut's *Crassostrea virginica*, the American or eastern oyster. This species is so popular that Fisherman's Wharf in San Francisco serves Connecticut oysters in preference to native Olympia oysters, at a price of \$25 more per bushel.

With such a profitable resource at their fingertips, Connecticut fishermen established themselves as the first harvesters of naturally grown oysters. By the early 1700s, many of Connecticut's beds were depleted. Consequently, Connecticut passed some of its first legislation in





*Shell fishing was not only done before motorized boats, it was also being done in Long Island Sound before the coming of the white man.*

regard to the fishery. The oyster fishery was to be regulated independently by each municipality.

One of the state's first environmentally concerned townships, New Haven enacted a law in 1762 which prohibited the taking of oysters during the summer spawning months. By 1776, laws prohibited the use of dredges (metal baskets which scrape along the bottom), as they were thought to damage the beds. Also, a "two-bushel" law was enacted. Some towns enacted a "residents-only" law.

By the 1800s, the Legislature still had done very little to protect the oysters. Over-fishing of "natural beds" would ultimately thrust Connecticut into rivaling the production of the Chesapeake Bay area. Connecticut oystermen were forced into experimenting with cultivation, a process by which oysters are farmed like a land crop. The stocks were not completely replenished until the 1850s, when the practice of shipping oysters from New Jersey and Chesapeake and transplanting them to Connecticut became popular. By the end of the 1850s, yearly shipments of two million bushels from southern waters for transplantation was common. Connecticut was the largest producer of seed oysters north of New Jersey. Oystermen would prepare beds of culch (old oyster shells) and catch the free swimming, scallop-like larvae, known as "set" after it settled and attached itself to the bed. The

culch could then be monitored for the next several years until the oysters were ready for harvest. Eventually, the natural beds no longer provided market-sized oysters but were excellent for catching young transplantable "seed" oysters which were ultimately used for new cultivated beds. Through cultivation, the depletion was arrested.

In an effort to protect the oyster industry, Connecticut enacted the "two-acre" law of 1855. Townships had the right to franchise two-acres or less to individuals for oyster cultivation. This law had grave implications for the larger oyster companies. A large company could easily cultivate 200 times that. Some company owners encouraged friends and family to apply for oyster grounds to gain more fishing space. By 1870, all town-regulated oyster grounds had been leased.

Before 1870, all fishing had been done in very shallow water in bays and near estuaries. Again, by necessity, oystermen were forced to adapt. Some oystermen began planting oysters in the deeper waters of Long Island Sound. By the mid-1870s, hundreds of acres of deep-water ground were being used for the farming, cultivation, and transplanting of oysters.

By 1880, an estimated 87,000 acres were being used for oyster cultivation. The need for an all-encompassing state agency to regulate the industry was evident. The Connecticut General Assembly established the State Shellfish Commission. It had jurisdiction over all shellfish-related activity in Connecticut waters below an imaginary line drawn on the shoreline's high water mark. This line would extend across all rivers, bays, and creeks. Towns still had jurisdiction over grounds above the line. The "two-acre" law was nullified and the Commission could relicense oyster grounds and receive a percentage of the proceeds from every bushel.

The Shellfish Commission created a map of all cultivating and natural oyster grounds, established a tax plan for this property, and reported annually to the Connecticut Legislature.

This Commission was the principal governor of Connecticut shell fisheries until 1971, when the DEP's Aquaculture Division was formed. After about one year, the Aquaculture Division was transferred to the Department of Agriculture.

At this time, the Aquaculture Division still maintains jurisdiction over Connecticut's shell fishery. With the leasing of Long Island Sound's fishing grounds as one of its primary functions, the Division sub-contracts the services of a surveyor/engineer. His purpose is to determine characteristics of leases, compute the acreage, and establish geographic coordinates for each corner of the lease. The Aquaculture Division is also involved in the restoration of the state seed oyster beds and the shellfish sanitation program which ensures that Connecticut oysters will be of the highest quality.

**C**ONNECTICUT'S GREAT SUCCESS in the oyster business is clearly the result of aquaculture. The



scientific farming of the sea has been done since the 1700s, in less advanced forms. Even so, many oystermen continued to work natural beds. Even today, many oystermen in areas such as Chesapeake Bay still rely on naturally-grown oysters.

Connecticut oystermen have realized the necessity of protecting the resource. Through aquaculture, Connecticut oystermen derive several benefits. While renewing the resource, the cultured oyster is also superior to those produced naturally in other waters.

In Long Island Sound, oysters may spawn from late June to early September. When water temperatures reach 68-70 degrees F., the oysters know the time has come. A single female oyster is able to release 23-85 million microscopic ova into the water several times each summer. Also cued by water temperature, the males release their sperm which fertilizes the eggs.

One amazing feature of *C. virginica* is its ability to change its sex. From the time the Eastern oyster reaches spawning age to the possible age of 40-plus years, the oysters may change sex and produce either ova or sperm as the propagation of the species requires. Often, groups of five to 10 male oysters will surround a female. If that female should die, one of the males will change its sex and produce the needed ova.

Regardless of the number of ova in the water, few get fertilized. This is indeed a good thing. If all eggs were fertilized and lived to become adult oysters, the sea floor would actually begin to rise. The fertilized eggs, or "spawn," swim freely for a short period of time. Then, they become zooplankton for approximately 14 days before they settle to the bottom and attach themselves to an object for the rest of their existence. This period of time is called "set." The newly settled oysters are referred to as "set," or "spat."

Because oysters are very much affected by the types of bottom on which they settle, oystermen must go to great lengths to prepare beds. Modern oyster boats are equipped with giant vacuum cleaners, called suction dredges. With these, the oystermen remove all debris from the sea floor until a hard mud bottom is reached.

Oysters will set on virtually any clean hard object. Oystermen have long known that the best beds are made from clean oyster shell, or culch. Barges with thousands of bushels of culch sail out to the beds. Nearby oyster boats with high pressure hoses shoot and wash the shells overboard, creating a layer of culch a few feet deep that covers several acres of sea floor. With hoses which pump hundreds of gallons per minute, oystermen have been instrumental in the containment of shore-front fires.

The set is one of the most crucial periods during oyster culture. If the beds are prepared too early, they become covered with algae, mud, and silt, thus becoming less desirable for setting. If the oystermen prepare the beds too late, the spawn will die. Oystermen must confer with the Aquaculture Division to determine exactly when and where to prepare the beds. If everything is done correctly and the oystermen have a little good luck, hundreds of

spat may set on a single oyster shell.

In about 10 months, the oystermen return to the setting grounds to "shift" the oysters. At that time, the dime-sized oysters are dredged and transplanted to the shallower, nutrient-laden waters for which Connecticut is famous. Oysters, being filter feeders, thrive in these areas. A single bushel of set-covered shell transplanted to the growing beds can produce up to 10 bushels of market-sized oysters. By moving oysters back and forth from the growing beds to deeper storage beds, Connecticut oystermen are able to regulate growth and provide premium-sized oysters during all months of the year.

An oyster's shape is very much determined by the environment in which it grows. Oysters which grow untouched until they are big enough to be marketed are often clustered and crowded. As a result, they are often disfigured and thin. The effect is similar to that of a plant competing for light. The oysters twist around each other often becoming long and narrow, like a shoehorn. These oysters are harvested for chowder because they are not meaty or attractive enough to be placed on a platter.

On the other hand, the Connecticut cultured oyster is about three to four inches long, about 1 1/2 inches to 2 inches wide and about 3/4 inch to 1 inch thick. Through transplanting, it is broken away from other oysters and grows by itself. As a result, it is able to achieve its perfect shape. Variations from nutrient-rich shallows to deeper cooler water are used to control its growth. The result is a perfectly shaped Connecticut "platter" oyster which is unsurpassed in flavor.

Although oyster culture may appear to be a matter of fertilizing potted plants, it isn't. Oystermen, like farmers, have their hardships. Inclement weather during a setting period can "blow away" millions of potential oysters, like a drought can ruin miles of crops. Oystermen have their locusts as well. They call them starfish.

Although many oysters are consumed during the embryonic stage by other filter feeders, small fish, and crustaceans, the most damaging predator — besides man — is the starfish. Groups of starfish can wipe out entire beds within days. Wrapping its legs around the oyster, the starfish pulls the two halves of the shell apart. The oyster, challenged to a "tug-o-war," buckles under to the superior endurance of the starfish. After pulling the oyster's shell open just a fraction of an inch, the starfish is able to stick its own stomach into the oyster's shell and digest it. It is possible for a large starfish to eat 10 mature oysters in a day.

In the past, oystermen would cut the legs off starfish and return them to the water, believing that they were dead. They were wrong. The starfish is able to rejuvenate lost limbs. As a result, oystermen had to find an alternative method to get rid of the predators.

Now, modern oystermen use a mop technique. Using "starboats," they drag huge mops over the beds. Due to the texture of a starfish's outer epidermis, the oystermen are able to entangle them in large numbers. The mops are hoisted aboard and doused in large vats of scalding hot



water. The starfish are killed instantly. Even with vacuum dredging before setting periods and mopping beds throughout the year, oystermen have a difficult time controlling starfish.

Oystering today is a rigorous profession requiring crews to work early, quickly, and for very long hours. However, much of the painstaking work that was once done by large crews is now done by machine. Aboard a modern oysterboat, a crew of three can do the work that once required up to eight men. A captain runs the operation from the wheelhouse. He is able to manipulate the huge booms which swing the dredges outboard and he controls the powerful winches which lower them to the bottom and raise them again. When the dredges are full, he swings the dredge over a huge basket and dumps the oysters. By conveyor belt, the oysters are carried to deckhands where they are sorted according to size. Sorting and shucking (for canned oysters) are still done by hand. Past oystermen used shovels and wheelbarrows to move oysters around the deck. Now, payloaders are used to cart the oysters to storage where they will await processing for wholesale.

At the dock, the oysters are separated again. Culch is thrown into huge piles for future use in the preparation of seed beds. Depending on size, oysters are packaged for platters or shucked by hand for canning. After being inspected and tagged to ensure quality, the premium Connecticut oysters are ready to be trucked and flown around the world. In a short time, they are adorning platters in the finest seafood restaurants.

**B**ECAUSE NEW ENGLAND is one of the most densely populated regions in the country, people are leery about consuming shellfish taken from its waters. Although there are environmental factors to be aware of, Long Island Sound oysters are of the highest quality. Not only are the oysters perfectly shaped and hearty, but they are high in vitamins and minerals and low in cholesterol and calories. They even may lower blood cholesterol.

Because of the potential dangers in these waters, the Aquaculture Division maintains and runs the Shellfish Sanitation Program, formerly run by the Department of Health Services. John Volk, director of the Aquaculture Division, explains that health standards are met by using guidelines provided by the U.S. Food and Drug Administration's National Shellfish Sanitation Program Manual of Operations.

Aquaculture researchers constantly go out and classify waters based on quality in shellfish growing areas. "There are two main parts to this classification," says Volk. First is an extensive shoreline survey. "We actually go out and walk every foot of the shoreline, looking for and mapping potential sources of pollution. Then, assessments are made on how water quality is affected in those areas."

The second step is to test those waters on a regular basis. Volk states that testing is often done under adverse



*The scientific farming of the sea has been done since the 1700s. The cultured oyster is superior to the naturally grown one.*

conditions. In Connecticut, that would be after a rainfall. At that time, pollution is worse because of runoff and discharge from sewage treatment plants. Sample shellfish meats are also tested for contaminants. After processing the data, judgements are made about whether or not to close and open areas. Under the FDA's newest guidelines, oyster harvesting grounds must be classified as prohibited, restricted, conditionally restricted, conditionally open, or open. With the public safety the first priority, all standards far exceed necessary specifications for health.

Volk explains that health buffers are a very important part of the program. Because an oyster is a filter feeder, it has the ability to concentrate in its tissues whatever is in the water it is filtering. These may be nutrients and they may be pollutants. The converse is also true. An adult oyster, which pumps an amazing 100 gallons per day through its system, is able to flush itself of pollutants. This process is called depuration. "In clean water," Volk says, "an oyster can be rid of all bacterial and viral pollutants in 24 to 48 hours." The law requires that oysters spend 14 consecutive days in clean water at least 50 degrees F. or warmer. This buffer is set to ensure consumers of the safest possible oysters. In fact, most marketed oysters spend up to three years of their life in clean water. All bushels of oysters harvested for market are inspected and certified to ensure compliance with FDA regulations.

While many of Long Island Sound's shellfish beds continue to flourish, there are many areas which have been prohibited or temporarily closed. Consumers should ask for inspection certifications when purchasing shellfish to make sure that their shellfish have not been taken from these areas. If you are a recreational shellfisherman, be sure to contact the town clerk of the municipality you plan on fishing. They will provide you with updated information on shellfish limits, permits, and ground quality.





Quarrymen at the Roebling Mine in New Milford, which was famous for its gemmy clear and yellow beryl garnet. Garnets weighing up to 20 pounds were taken from this site. (Photo: circa 1900, from the collection of John A Pawloski)

## Our State Mineral, the Garnet

by  
**Patricia Konarski**  
Writing Intern  
The Connecticut State Museum of  
Natural History and English  
Department  
The University of Connecticut

FROM THE ARABIAN NIGHTS to Indiana Jones, jewels fire our imagination with stories of buried treasures, secret mines, and magical caves. For mineral collectors, Connecticut can add a touch of reality to those dreams.

The garnet — Connecticut's state mineral and the birthstone for January — "may be found in many regions of the state, probably in most counties, but typically they are not of gemstone quality," says Ellen Faller,

senior museum associate and manager of the mineral collection at the Peabody Museum of Natural History at Yale University. So, if you're looking for gemstones in Connecticut, you probably won't strike it rich, but you can have fun.

Birthstones, zodiac stones, talismans, and medical cures are some of the uses that precious and semiprecious stones have been put to. The garnet, a member of the pyropeadmandine species, is the type found most often in Connecticut. This type is a dark, almost black, red — not the clear bright red which is preferred as a gemstone. The name garnet is probably derived from a resemblance to red pomegranate seeds or to a carbuncle (a glowing coal). Today garnets are known as a

family of minerals, varying from red to green. All garnets have the same atomic structure, but differ in chemical composition.

"In ancient times garnet was in a special category of gems, known as the *fiery gemstone*," writes John D. Rouse in his book *Garnet*. "Ancient peoples were intrigued by the fire-like qualities of the garnets." They thought the garnet reflected the power of natural forces, such as lightning.

GEMS HAVE BEEN USED in religious worship throughout history. The Bible, in Exodus, specifies that the breastplate of the high priest shall include 12 stones, including a carbuncle, to represent the 12 tribes Of Israel. Because rubies were unknown in ancient



Egypt, the carbuncle is believed to have been a garnet, according to G.F. Kunz in *The Curious Lore of Precious Stones*.

In a 13th century treatise, *Book of Wings*, Ragieli wrote: "The well-formed image of a lion, if engraved on a garnet, will protect and preserve honors and wealth, cures the wearer of all diseases, brings him honors, and guards him from all perils in traveling."

Red stones such as garnet were once thought to contain specific virtues related to their color. "These were thought to be sovereign remedies for hemorrhages of all kinds, as well as all inflammatory diseases; to exercise a calming influence and to remove anger and discord," wrote Kunz.

It was also thought by some Asiatic tribes that a garnet bullet would inflict a more deadly wound than a lead bullet because of the stone's red blood color. Garnet bullets were used by the Hanzas in 1892 during a rebellion against British troops on the Kashmir frontier.

In the 18th century, the custom of wearing one's birthstone was popularized in Poland. Wearing a natal stone impresses people "with the idea of possessing something more intimately associated with his or her personality," wrote Kunz.

ALTHOUGH FASCINATING to read about, such mystical properties of garnet have no scientific support. There are practical values for garnet, however. In Connecticut, garnet was mined primarily for use as an abrasive, for grinding wheels and saws, and to create garnet paper, a better quality of sandpaper. Because of its hardness, garnet makes an excellent abrasive for wood, leather, glass, metals, and plastic.

While Connecticut garnet has been primarily an industrial commodity, some gemstones have been found, notably at Branchville, which was famous because it produced so many rare species including Fairfieldite and Reddingite. In fact, "Tiffany's and J.P.



*You may not strike it rich hunting for garnets in Connecticut, but you might have some fun. (Photo: courtesy Connecticut State Museum of Natural History)*

Morgan financed some of the digs," said Robert W. Jones of Scottsdale, Arizona, a lifelong student of Connecticut minerals.

Mining for industrial garnet flourished briefly at the turn of the 20th century, according to Marie White of Roxbury who is writing a history of the town's garnet mine. Major mines were in Roxbury and West Redding. It is abundant in those and many other towns, including Middletown, Portland, Tolland, Stafford Springs, Bolton, South Glastonbury, Willington, Ashford, and Union.

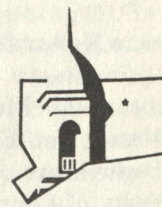
"It outcrops all over the state, in stream beds, in roadways. Roxbury eventually began to use the discarded rubble from the mine for roadfill, so you even find garnets in the streets," said Jones. "The mines hired immigrants to handpick the garnets out of the schist; the stone was blasted and crushed, and then people stood along a conveyor belt and picked it out," explained Jones.

"Startled and thrilled the hikers were, at the sight of garnet crystals lying loosely all about these roads.

Handfuls of dull red, opaque garnet could be had without any effort," wrote Katherine Kauth, about her visit to the "old siderite" mine on July 9, 1949.

"There were garnets everywhere, embedded in the rock, lying free in the grass, hidden in the dirt. Our son Jeff talked of taking them to a jeweller, of selling them, of getting rich." Harold Hornstein wrote of his family's excitement in a quest for minerals at the same mine in 1972.

THE GARNET (almandine garnet) was made the State Mineral of Connecticut by the 1977 General Assembly. To follow your own quest for garnet, see *Rockhounds Guide to Connecticut* by Kathleen H. Ryerson, published by Pequot Press, Old Chester Road, Chester, CT 06412. Researchers may use the mineral collections at the Peabody Museum of Natural History at Yale University or the Connecticut State Museum of Natural History at The University of Connecticut, by appointment. The Peabody offers a permanent exhibit of garnets, and The Connecticut State Museum of Natural History will feature a display of garnets with hands-on activities for children during its family Day, "Fossils and Minerals," on January 15. For further information, call 486-4460.



*This article was contributed by The Connecticut State Museum of Natural History at The University of Connecticut in Storrs, which exhibits mounted birds of Connecticut, the largest mounted white shark on display in the eastern United States, "Videoplace" interactive video, Indian artifacts, and offers programs for teachers, children, and adults. For information, contact the Museum, UConn Box U-23, Storrs, CT 06269-3023; phone (203) 486-4460. ■*





Connecticut's "Tobacco Valley" was the scene of groundwater contamination by the pesticide EDB. This was an instance of non-point source pollution. (Photo: Michael Bell)

# Non-Point Sources

## A look at a major cause of water pollution in Connecticut

by  
Diane Mayerfeld

**I**T'S HOT. YOU'VE BEEN HIKING for miles, and you are thirsty. Your path crosses a stream. Do you stop and help yourself to a drink? Of course not. You know this water may not be fit to drink. This is a small stream and there are no factories or sewage treatment plants upstream -- how can it be tainted? The answer is "non-point source" pollution.

Non-point source pollution means water pollution other than that caused by a discharge pipe from a factory or municipal sewage treatment plant. We all know that sewage and industrial wastes can damage our rivers, but there are also a myriad of smaller, scattered water pollution sources that are part of every day life. "Non-point source" is not a terribly good name. It really doesn't tell you anything about the source or type of pollution. The problem is that no one seems to have come up with a better name representative of the many different kinds of pollution sources covered by the phrase non-point source.

While people cause most of the non-point pollution, they don't cause all of it. Geese or beavers can contaminate

lakes and streams with their droppings. However, most of non-point source pollution is due to human activities. Construction-related erosion and sedimentation, urban and agricultural stormwater runoff, failing septic systems, and fertilizers and pesticides which leach into groundwater are all part of Connecticut's non-point source problem.

**I**N 1967, THE STATE OF CONNECTICUT passed the State Clean Water Act, which was soon followed by the Federal Clean Water Act amendments of 1972. Both of these laws emphasize the abatement of pollution from concentrated "point sources"; that is, urban and suburban sewage and industrial wastewater and cooling water discharges. Although much remains to be done in treating and reducing these sources of pollution, we can now also address other, more diverse non-point sources of pollution.

Between 40 and 80 percent of America's surface water pollution has been attributed to non-point sources. In Connecticut, much of the pollution of the major rivers, such as the Connecticut, Housatonic, Naugatuck and Quinnipiac, comes from industrial and municipal point



sources. In contrast, many of the pollution problems of the smaller rivers and streams, lakes, ponds and groundwater come from non-point sources. Long Island Sound, which has some characteristics of a large lake, is probably equally impacted by point and non-point sources of pollution.

**I**N CONTRAST TO POINT SOURCES, the non-point source problems may worsen before water quality improvements are noticeable. One reason for this is that there are now more humans around, generating more wastes and disturbing more sensitive land and water resources through development and day-to-day activities. Another reason is that people are increasingly using and disposing of chemicals and materials that do not easily degrade through natural processes. Finally, some existing non-point source problems will prove to be very costly and difficult, if not impossible, to correct. Some people argue that resources are better spent on preventing future non-point source problems than correcting some of our past mistakes. Making these decisions will be difficult and challenging.

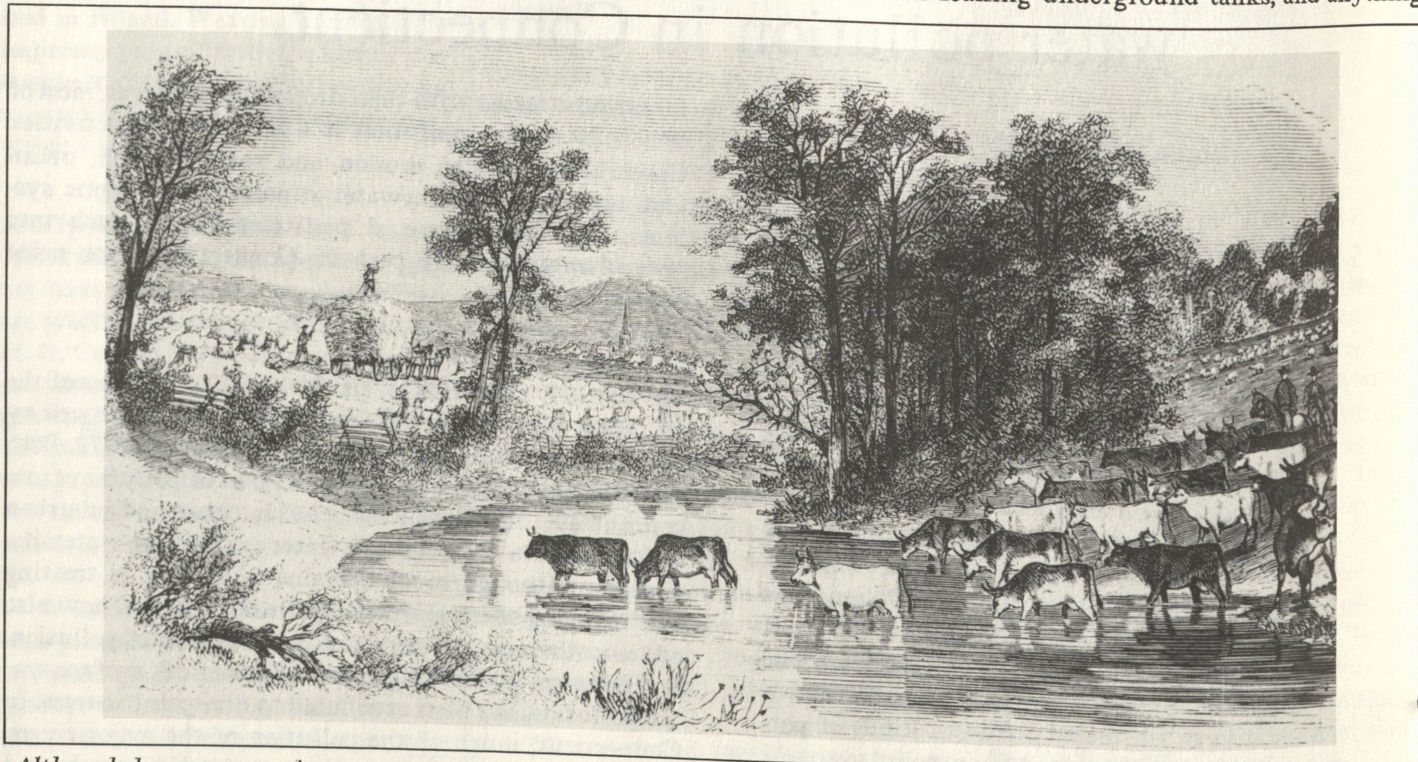
**L**AND DEVELOPMENT is probably the most significant cause of non-point source pollution in Connecticut, and it shows no sign of abating. When rain falls on undeveloped land, some of it is absorbed into the ground, where it is either taken up by plant roots or it moves between soil or sand particles and through cracks in bedrock as ground water. The remainder runs over the surface of the ground, filtered and slowed by natural upland and wetland vegetation, until it reaches a surface water body or evaporates.

Before it even reaches the ground, it can pass through polluted air, picking up particulates and becoming acidic. In developed and un-developed areas, rain follows a different path. If it lands on hard surfaces such as paving, roofs, or bare, compacted ground, little or no water is absorbed; most runs off. Even lawns usually absorb less water than do areas with natural vegetation. As water flows unchecked over these surfaces, runoff in developed areas carries with it many of the different substances it encounters. What kinds of things might rain in a residential area accumulate?

On the roof, it may pick up some soot or ash from a wood stove, fireplace, or furnace. Then, down the rain-spout and onto the driveway, where it may pick up some oil drippings. In the gutter, it runs over dog droppings and collects silt, sand and de-icing salt left over from winter before it disappears down a storm drain, only to emerge with all its dirt and pollutants into a nearby stream or river.

Many other substances wind up on the ground in residential areas: bits of rubber from tires, asbestos from brake linings, fertilizers and pesticides from lawn and garden maintenance, detergents from washing the car. The list is almost endless. Construction sites can lose so much soil that they choke small streams or silt in wetlands. Most people have seen sheets of brown water pouring off construction areas during a heavy rainstorm.

The rain which does soak into the ground in residential areas can pick up contaminants associated with pesticides and fertilizers in lawns and gardens and waste oil from improper motor vehicle maintenance. Other non-point sources from residential development can include fuel oil from leaking underground tanks, and anything



*Although humans are the cause of most non-point source contamination, it can also happen as the result of geese, beavers, or cows. (Drawing by John W. Barber, 1820, from Connecticut Historical Collections.)*



improperly poured into a septic tank, such as high-strength household cleaners. In more careless households, paint thinners and other strong cleaning solvents may also be improperly disposed of.

Rain falling in cities picks up all the contaminants of residential areas, but in greater quantities. In addition, even less water can seep into the ground, leaving almost all the rain to rush down streets and gutters and into storm sewers, picking up all sorts of debris.

**O**N A NATIONAL LEVEL, agriculture is a significant non-point source of pollution. In Connecticut, we have so little farmland left that pollution from land development is believed to outweigh that from agriculture, but even in our state, farms may cause serious local contamination of surface and ground waters. Rain falling on farmland may pick up pesticides and fertilizers, acid runoff from silage, and nitrates, salts, and bacteria from manure lagoons and barnyards. Freshly-plowed fields erode easily, especially on steep slopes. Another concern is that fertilizers lost from agricultural lands may be washed downstream, ultimately into Long Island Sound, thus contributing to its pollution stresses.

The full list of non-point sources of water pollution is too long to repeat here. Some of the more common sources in Connecticut include highway and street runoff, air pollution, landfilling of trash, and discharges into Long Island Sound from recreational boats. A more complete discussion of non-point source pollution in Connecticut and recommendations for its improved management is contained in DEP's *Non-Point Source Assessment and Management Plan* available from the DEP's Water Compliance Unit.

**B**ECAUSE OF SO MANY SOURCES and causes of non-point source pollution, it is difficult to figure out how to prevent this problem. In all of Connecticut, there are less than 2000 permits for municipal and industrial wastewater discharges. It is difficult enough to regulate and enforce this number of pollution sources, but the problem pales in comparison to the challenge of preventing small amounts of pollution from the millions of residences and cars and thousands of miles of roads and acres of farms in the state. In fact, it is not possible to regulate all these sources on the same case-by-case basis that we use for point sources. Instead, the plan is to rely on a combination of improved local land management practices and development design, and most of all on educating everyone from young children to their grandparents and from individual citizens to major businesses and large government agencies.

**W**HILE THE SCATTERED NATURE of non-point source pollution makes it a difficult problem for government, there are many things the individual citizen can do.



*Construction projects such as this one are a significant source of sediment which clogs streams and silts in wetlands and ponds. Proper erosion control measures can help preserve water quality. (Photo: Marla Butts)*

#### **Dispose of wastes properly**

- \* Minimize your use of hazardous materials.
- \* Dispose of any hazardous wastes at a household hazardous waste collection rather than in the trash or down the drain.
- \* Encourage and participate in local recycling programs.
- \* Minimize the generation of non-recyclable wastes.

#### **Minimize pollution sources**

- \* Faulty septic systems
- \* Fuel storage leaks
- \* Drips or leaks from cars
- \* Water softener systems which discharge brine into the septic system
- \* Improperly applied fertilizer and pesticides
- \* Poorly stored chemicals

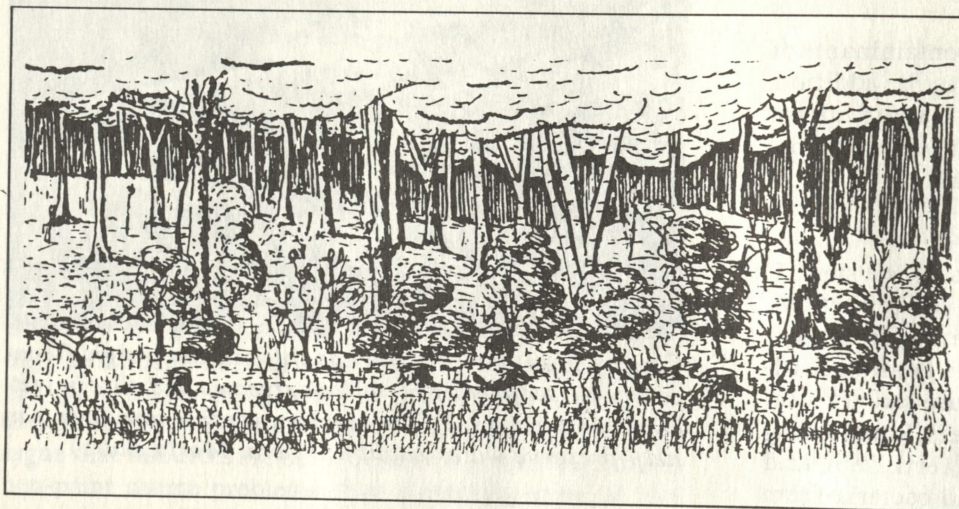
#### **Participate in local programs**

- \* Inland wetlands protection
- \* Soil erosion and sedimentation prevention
- \* Cooperative extension programs on garden and forest management

**Y**OU MAY WANT TO EXAMINE DEP's *Non-Point Source Plan and Management Strategy* and comment upon its findings and recommendations. Copies of this report may be obtained by writing DEP Water Compliance Unit, 122 Washington Street, Hartford 06106, or phoning (203) 566-7049. In December, the DEP requested public comment on the report. Comments are due by February 9, 1990.

And finally, you can help make others, such as your neighbors, municipal officials, and state representatives, aware of their role in causing and preventing pollution of our water from a thousand small, but cumulatively significant, non-point sources. Non-point source pollution can only be overcome if people work together. ■





## Openings for Wildlife

### An insight into habitat management

OPENINGS in continuous and extensive forest blocks can provide the diversity needed to sustain a greater variety of wildlife species. Such openings provide food, nesting, resting, and brooding sites. Natural forest openings occur as a result of insects, fire, storms, and disease.

Openings provide edge, the place where different plant communities, successional stages, or stand conditions come together. The area influenced by the transition between communities is the "ecotone." Ecotones are rich in both the number of wildlife species and individual animals because they provide more of the needs for a variety of wildlife than does a single vegetative type.

The vegetation in an opening furnishes forage for deer, wild turkey, cottontail rabbit, grouse, song sparrows, broad-winged hawks, flickers, and other wildlife. The value of a clearing is increased if it is managed for herbaceous vegetation and shrubs which provide valuable wildlife food and cover. Clearings also attract a variety of insects which some birds are dependent on as a source of high protein.

Openings in forest lands fall into two categories:

*Permanent:* (1) Those that will be maintained as a herbaceous opening (grass and legumes); and (2) those that will be maintained to encourage early succession and native vegetation (brushy areas).

*Non-Permanent:* (1) Those that will be cut and allowed to revert to native vegetation or planted to a more desirable tree species. Non-permanent openings are important to wildlife, but their benefits are short-lived.

Permanent herbaceous openings are the most valuable to wildlife. Grasshoppers and other insects that thrive in the grasses and forbs (see glossary) provide food for growing grouse chicks, turkey poults, and a variety of songbirds.

IN GENERAL, the following guidelines can be applied to forested land:

1. Maintain at least two percent of the total acreage in permanent herbaceous plots.
2. Maintain at least five percent of the total acreage in permanent

openings encouraging early successional, native vegetation.

Openings in forested land can be developed in favorable locations through cordwood cutting, regeneration cuts, or by widening existing openings along access roads and trails. The guidelines described below should be followed for creating openings:

1. Openings should be no less than one-quarter acre (ideally between one half and one acre) in size; located in an east/west direction for maximum sunlight.
2. Openings should be irregular in shape, preferably long and narrow, taking on an "S" or "J" pattern. The width should be no less than one and one-half times the height of uncut adjoining trees.
3. Once trees are cut, stumps and rocks should be removed by a bulldozer if an herbaceous opening is desired. This allows for site preparation for seeding and periodic future maintenance.
4. Locate openings close to early successional stage conifer patches; this provides valuable wildlife cover requirements.

Openings that will be maintained for herbaceous growth should be seeded to provide optimum wildlife food sources, and mowed every two to three years to discourage the natural invasion of woody plants. Early successional openings should be mowed (brush-hogged) every four to six years.

Site preparation for seeding should be as follows: (1) disking, (2) liming, (3) fertilizing, (4) disking again, and (5) seeding. Soils can be tested for lime and fertilizer requirements through a local Soil Conservation Service office or University Extension Service. Commonly used seeds include ladino clover, birds' foot trefoil, rye grass, millet, sorghum, buckwheat, and various conservation mixes. In Connecticut, unseeded openings generally revert back to blackberry, pokeweed, sumac, and elderberry.

SHRUBS, such as autumn olive, gray



dogwood, honeysuckle, and highbush cranberry, can be planted and encouraged at the edge of forest land openings. These shrubs provide valuable food and cover and do not require annual maintenance, except for occasional fertilizing and cutting of undesirable plants around the plantings.

Coniferous cover can be incorporated into opening schemes. Once a conifer has reached 10 to 12 feet, it may be cut to about four feet high in order to provide heavy cover close to the ground.

### Glossary

**Community:** a group of one or more populations of plants and animals in a common spatial arrangement.

**Conifer:** includes a wide range of trees, mostly evergreens, that bear cones and have needle-shaped or scale-like leaves.

**Forage:** vegetation used for food by wildlife.

**Forb:** any herbaceous plant species other than those in the grass, sedge and rush families; fleshy leaved plants.

**Herbaceous:** a plant that grows from seeds or perennial roots rather than from woody, above-ground parts.

**Regeneration cut:** any removal of trees intended to assist regeneration (renewal of the tree crop) already present or to make regeneration possible.

**Stand:** plant communities, particularly of trees, sufficiently uniform in composition, constitution, age, spatial arrangement, or condition to be distinguishable from adjacent communities.

**Succession:** the changes in vegetation and in animal life that take place as the plant community evolves from bare ground to climax (e.g., old growth forest).

### References and Further Reading

The bulletins listed below are available through the Distribution Center, 7 Research Park, Cornell University,

Ithaca, NY 14850. Prices available upon request.

*Enhancement of wildlife habitat on private lands.* IB-181.

*Managing small woodlands for wildlife.* IB-154.

Hassinger, J., et al. *Woodlands and wildlife.* Penn. State Univ. College of Agriculture, University Park, PA.

Shomon, J. J., B.L. Ashbough, and C.D. Tolman. 1966. *Wildlife habitat improvement.* National Audubon Society, 1130 Fifth Avenue, New York,

NY. 96 pp.

The Technical Assistance Information Series is 75 percent funded by Federal Aid to Wildlife Restoration -- the Pittman-Robertson Program. The Pittman-Robertson Program provides funding through an excise tax on the sale of sporting firearms, ammunition, and archery equipment. The remaining 25 percent of the funding is matched by the Connecticut Wildlife Division. ■



*Permanent herbaceous openings are the most valuable to wildlife. (Photo: L.L. Rue)*



## All right, what is benthos?

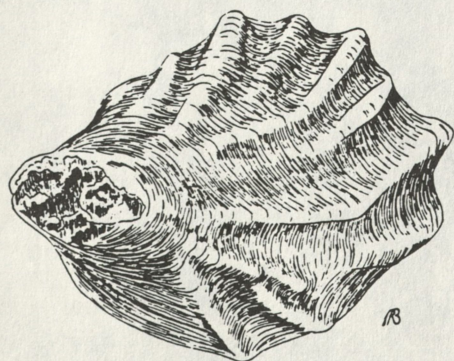
by  
Alan Levere

Senior Environmental Analyst

I GOT A CALL RECENTLY from an elementary school teacher requesting general introductory material about Long Island Sound. It didn't take long to give her the best option I know of -- *The Long Island Sound Atlas of Natural Resources*.

Actually, it is no surprise I went with confidence to this recently reprinted atlas. I use it as a reference to the many different aspects of the Sound. In the 52 pages are 13 chapters, from two to five pages long, covering such subjects as fish, birds, mollusks and crustacea, benthos, vegetation, mammals, and reptiles. Pretty much everything is touched on, making this book a fine primer on the diversity is our Sound. Take benthos for instance.

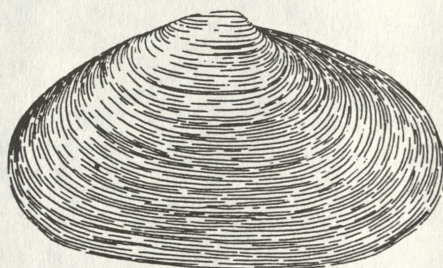
Be honest now. Do you know what benthos means? I can ask this question without feeling accusatory because I didn't know either; or maybe I did know once, but have quite thoroughly forgotten. Is anything about benthos important?



*Eastern Oyster*

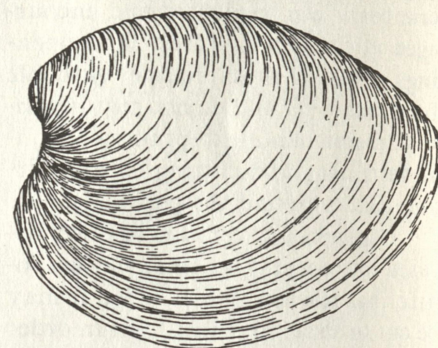
Interestingly enough, it turns out that the section on benthos (which, by the way, is defined as "all plants and animals living on or in the sea floor," like crabs, corals, clams, etc.) opens up a fascinating world of life that, in fact, can be used to diagnose the health of the Sound.

The *Atlas* goes on to raise and answer a variety of different questions throughout its broad range of chapters. Consider the following:



*Soft-shell Clam*

- Fresh water from rivers flows into the Sound and floats above the more dense saltwater. What happens to the pollution in this fresh-water? Does it stay with the fresh-water or settle out to the bottom?
- In the late 1930s, three million bushels of oysters and clams were taken from Long Island Sound. Why was the take only about one half of one percent of that total in 1970 (about 16,000 bushels)?
- We are fortunate that our coast lies along the Atlantic flyway, a major eastern bird migration route. What is the best time of year for observing them and where are the key areas.



*Hard-shell Clam*

By means of the text, the maps, and the diagrams these questions, and many more, get answered.

I recently reread the *Atlas*. It made me realize the complexity of the biologic web and the resulting conflict among the many environmental issues in Long Island Sound. The Sound seems to be frequently in the news, but sometimes it is difficult to tie the concepts of the stories together. I think you will find the *Atlas* will help you tie up many of the loose ends.

We saw in the drainage basin article a few months ago that nearly all the water that flows through the state ends up in Long Island Sound. Hopefully, that increased your curiosity about the current state of the natural resources that make up the Sound. If you go to this *Atlas* for background information on the key issues, you won't be disappointed. It worked for the teacher who now has just the introduction to the Sound she needed.

The *Long Island Sound Atlas of Natural Resources* is \$5.00. If you order please include state sales tax of eight percent and \$2.00 for handling per order (not per item). Our address is: DEP-NRC, Map Sales, Room 555, 165 Capitol Avenue, Hartford, CT 06106.





*The Earth in space. (DEP file photo)*

# Connecticut to Celebrate Earth Day 20

by the staff of  
Connecticut Earth Day 20, Inc.

**I**N APRIL, 1970, the first Earth Day launched the environmental protection movement in the United States. Over 20 million Americans participated and changed the nation and the world. We have come a long way in the 20 years since that day in 1970. We created government programs to protect our air, water, and land. We established environmental education resources, and made the environment a

household word and a major government policy priority.

In Connecticut, we have much to celebrate on Earth Day 20. Since Earth Day in 1970 we have taken an ongoing leadership role. We were one of the first states to create a super agency. Our Clean Water Fund, tidal and inland wetlands regulations, ground water protection, agricultural land protection, and open space legislation

serve as models for the rest of the country. In many other programs, we are recognized leaders as well.

Connecticut Earth Day 20 is an opportunity to take once more a leadership role in renewing environmental awareness and passing that commitment on to a new generation. We invite you to join in a great event and be part of an historic celebration of our state's future.



The state's celebration is being organized by Connecticut Earth Day 20, Inc., which is a non-profit organization with an office in New Haven. Governor William A. O'Neill chairs the honorary board which is co-chaired by actress Joanne Woodward and former state environmental commissioner Dan Lufkin. Other members of the board include Paul Newman, Katharine Hepburn, Meryl Streep, Arthur Miller, and Susan Saint James, plus educators, elected officials, environmentalists, corporate executives, and concerned citizens. The steering committee is co-chaired by Rita Bowlby, a marketing communications executive, and Leslie Carothers, DEP commissioner, and has representatives from environmental groups, education, business, and others.

A quick glance at today's headlines puts the magnitude of the problems into sobering perspective. Global warming, acid rain, and destruction of the rain forests are all combining to cause environmental nightmares around the planet and in our own state. Unhealthy air quality, destruction of crops, polluted ground and well water, toxic wastes, and threats to Long Island Sound are just a few of the problems that have come home to us in Connecticut. Our economy and our environment can no longer withstand the dangers these conditions are creating. These are global problems that have come to rest at our own doorstep and must be resolved.

Connecticut Earth Day 20 is now enlisting the help and support of our state's government officials, business leaders, environmentalists, artists, writers, educators, major celebrities and concerned citizens determined to make a difference. Support for Connecticut Earth Day 20 has become an issue of survival for us all.

In Connecticut, Earth Day 20 educational programs and activities include:

**Grass Roots Involvement** — Earth Day flag ceremonies and environmental awareness activities will be held simultaneously on the town greens of each of Connecticut's 169 towns on April 22.

**Hands-On Education** — education programs will reach every level; elementary and secondary schools, colleges and universities.

**Public Forum and Education** — well-known speakers and educators will donate their time and talent. Public service spots will be seen on TV, a public forum and seminars will be held statewide.

**Musical Star Fest** — top Connecticut artists will appear in an unforgettable kickoff performance at the American Festival Theater on April 21.

**Rid Litter/Plant A Seed** — community groups will join together to clean up our cities and countryside and then plant wildflower seeds and tree seedlings.

**Spreading The Word** — periodic newsletters and ongoing calendars of

events will be distributed to publicize activities.

Although progress has been made, the environmental damage of the last decade alone has been unprecedented.

The Connecticut Earth Day 20 celebration is our state's part in a new national thrust to return environmental awareness to everyday American life. It is, in fact, a truly global effort aimed at establishing a long-term commitment to building a healthy, safe and viable planet.

Remember.

The earth doesn't stand a chance without you.

For more information on any Connecticut Earth Day 20 activity or program, please call 203-865-ERTH, or write: Connecticut Earth Day 20, Inc., 90 Sargent Drive, New Haven, CT 06511. ■

## A Planet at Stake

by

Susan Merrow

Vice President, Sierra Club

**I**N 1990, Connecticut will celebrate the 20th anniversary of Earth Day.

The annals of environmental history tell us that April 22 of 1970, the original Earth Day, touched off a wave of environmental concern that continues to reverberate throughout this country and the world. Suddenly that spring, it dawned on the collective consciousness of the nation that the resources which we were in such a rush to exploit were finite, and that our haste to consume them would alter the natural world in unthinkable ways. We could no longer value short-term creature comforts over the long-term sustainability of the natural world which supports us all. The subject of ecology came out of the college classroom, onto the Main Streets, and into our living rooms.

The movement that began that spring did indeed change the world. Fueled by the Earth Day spirit, a gen-

eration of activists educated itself, organized one another, challenged policy makers . . . and even *became* policy makers. The victories are many. They can be numbered in natural resources saved, landmark laws passed, and pollution cleaned up or prevented.

While victories alone would be cause enough to celebrate the 20th anniversary of Earth Day, there's a much more compelling reason. The next 20 years will bring us face to face with environmental problems so far-reaching and so challenging that we could hardly have imagined them 20 years ago. Unless we act now to reverse the trend toward the rapid depletion of resources, we will cause life-threatening social and climatic changes on a global scale. Our children will inherit a hostile and alien environment.

We must galvanize the next generation, not just in this country but around the world. We cannot just pass a torch; rather, we must light millions more. The spirit of Earth Day, the feeling that together we can make a difference, must continue. Through Earth Day 20, we will instill in the next generation the same passion that fueled the movement for twenty years.

There is no time to lose. There is a planet at stake. ■



# 1989 Environmental Legislation

## A Summary of the new laws

by

Michael Sullivan

Executive Assistant, DEP

*(This is the second of two articles summarizing significant environmental legislation passed by the Connecticut General Assembly in 1989.)*

### IV. HAZARDOUS MATERIALS

#### 1) P.A. 89-365. An Act Concerning the Cleanup of Hazardous Waste.

**Inventory.** This act requires DEP to compile an annual inventory of contaminated wells and leaking underground storage tanks and report to the environment committee by February 1 each year. This act also requires the state to initiate final remedial action by the year 2000 at each hazardous waste disposal site.

**Grants to Municipalities.** Under this act, DEP may establish grants to municipalities and regional refuse disposal districts to clean up landfills determined to be hazardous.

**Exemption from Assessment.** This act exempts any hazardous waste that is recycled, as well as any hazardous waste for which an assessment was paid during the course of handling. For the purposes of this exemption, "recycled" means a waste that is processed to recover a usable product or is regenerated or reused. Burning for heat value shall not be considered recycling.

**Business Environmental Cleanup Fund.** This act creates a business environmental cleanup revolving loan fund. The Department of Economic Development (DED) may use the fund to provide loans to businesses for the

containment, removal, or mitigation of releases of oil, petroleum, chemical liquids, solids, or gaseous products of hazardous waste.

#### 2) P.A. 89-197. An Act Concerning Payment of Fees for Environmental Reviews of Transfers of Hazardous Waste Establishments.

Under this act, DEP may adopt regulations to establish a fee structure to support the Hazardous Waste Property Transfer program. These regulations would establish fees for reviewing negative declarations.

#### 3) P.A. 89-212. An Act Concerning the State Emergency Response Commission.

**Enforcement Regulations.** This act requires DEP to adopt regulations for enforcement of reporting requirements pursuant to Emergency Planning and Community-Right-to-Know Act (SARA Title III). This act also gives the chief elected official of each municipality the opportunity to pursue enforcement of reporting requirements.

**Reporting Requirements.** This act also requires that the owner/operator of any facility where an extremely hazardous substance is present over threshold planning quantities notify the local emergency planning committee (LEPC) and the State Emergency Response Commission (SERC) that the facility is subject to the requirements of SARA. When a release of any extremely hazardous substance occurs, the owner/operator shall notify the

community emergency coordinator of the LEPC of any area likely to be affected, as well as the SERC.

The owner/operator of any facility required by OSHA to have a material safety data sheet available for a hazardous chemical shall submit the sheet for each chemical to the appropriate LEPC, SERC, and the local fire department.

**Penalties.** This act provides that penalties for any violation of SARA Title III shall not exceed \$1000 dollars per violation.

**Protection from Liability.** This act also offers protection from liability to members of Local Emergency Planning Committees.

#### 4) P.A. 89-373. An Act Concerning Underground Storage Tanks.

**Cleanup Fund.** This act establishes the "Underground Storage Tank Petroleum Cleanup Fund" to reimburse responsible parties for costs, expenses, and other obligations incurred as a result of releases. Reimbursement shall include third party claims for bodily injury, property damage, and damage to natural resources. Responsible parties must bear all costs of the release between \$10,000 and \$1,000,000. This act raises the quarterly tax on the gross earnings of companies that refine or distribute petroleum products in this state from two to three percent. One third of the tax shall be credited to the Underground Storage Tank Petroleum Cleanup Fund.

**Review Board.** This act establishes



a review board to examine applications for reimbursements and payments from the fund.

**Deadline Extension.** This act mandates that any town or regional school district shall have until October 1, 1991 to replace underground storage tank systems of a public school building provided an application for a project is made before October 1, 1990.

**5) P.A. 89-330. An Act Concerning the Low-Level Radioactive Waste Fund.**

**Low-Level Radioactive Waste Management Fund.** This act revises the current financing framework by establishing a fund to pay for the state's expenses and for acquiring an option to purchase land for a low-level radioactive waste management site. After July 1, 1989, all funds in the low-level radioactive waste account will be credited to this fund. As outlined below, DEP shall assess all generators in the state for a total of \$3.1 million to pay for the state's expenses.

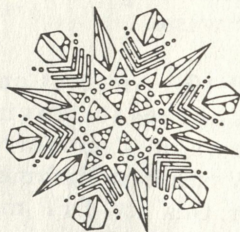
**FY 1990 Assessment.** Generators shall provide information needed to determine that generator's pro-rata assessment within 60 days. DEP shall determine each generator's share by multiplying the generator's percentage share of the total volume of waste received for burial in FY 1988 by the total assessment of the state's expenses. Any generator who wilfully fails to provide the information or who knowingly makes any false statement shall be fined up to \$25,000, with up to \$1000 per day for continuing violations.

**Reporting Requirements.** Each generator shall report each low-level radioactive waste shipment to DEP and shall submit a copy of each shipping manifest and each receipt of shipment from each disposal site. The act also requires each generator to submit a report to DEP on the total amount of low-level radioactive waste received at a disposal facility for burial during the previous calendar year. Any generator who wilfully fails to submit such documents or who knowingly makes any false material statement on such documents, shall be fined up to \$25,000, with \$1000 a day during

which such violation continues.

**6) P.A. 89-201. An Act Concerning Radiation Control.**

Under this act, possession or operation of x ray devices for diagnostic or therapeutic purposes are no longer exempt from the registration requirements if done by persons licensed to practice medicine, surgery, osteopathy, chiropractic, natureopathy, dentistry, podiatry, and veterinary medicine. This act also states that only hospitals operated by the state or a municipality shall be exempt from payment of the registration fee for x ray devices. Finally, this act requires all operators of such devices to register with DEP.



**7) P.A. 89-209. An Act Concerning the Storage of Hazardous Substances Near Watercourses.**

Under this act, DEP may adopt standards for the storage of hazardous substances near watercourses. Such regulations shall establish best management practices for the storage of such substances, including a determination of a minimum distance between any hazardous substance and a watercourse. These regulations also shall establish a threshold quantity for storage before compliance is required.

**8) P.A. 89-146. An Act Concerning Local Project Review Committees for Hazardous Waste Facilities.**

**Notification.** This act requires DEP to notify the Hazardous Waste Siting Council when a hazardous waste facility is proposed.

**Application Fee.** Upon filing an application, the applicant shall deposit with the Council up to \$50,000 (increased from \$30,000). These funds are to be used by the local project review committee for technical and profes-

sional assistance in reviewing the proposed hazardous waste facility.

**V. AIR QUALITY**

**1) P.A. 89-227. An Act Concerning Chlorofluorocarbons.**

**Regulations.** DEP shall adopt regulations by January 1, 1991, establishing: 1) standards for emissions of chlorofluorocarbons (CFCs); and 2) requirements for the collection, storing, and recycling of CFCs used in refrigerators and air conditioning systems. In adopting such standards, DEP shall consider ozone depletion and the cumulative effect of emissions of CFCs.

**Product Bans.** This act prohibits the sale of any new product packaged with or composed of any CFCs after July 1, 1992. In addition, the act prohibits any state agency or institution from purchasing these products after July 1, 1991. Buildings and structures permanently attached to real estate are exempt from these prohibitions if permitted, under construction, or completed by July 1, 1992. DEP may exempt any person from these prohibitions for one year if no technological or economic alternative to the use of CFCs exists.

**Automobile Air Conditioners** This act also prohibits the sale of any container of CFCs to recharge: 1) an automobile air conditioning system, unless the buyer is licensed under Section 14-52; and 2) an air conditioning or refrigeration system, unless the buyer is licensed under Section 20-333 to perform work on such systems.

**Reports.** The owner or operator of each stationary air contaminant source emitting more than 10 tons of CFCs yearly shall submit to DEP a plan to reduce these emissions by 50 percent by January 1, 1994. These reports are to be submitted to DEP by January 1, 1990.

**2) S.A. 89-22. An Act Concerning a Study of Alternative Programs to Improve Connecticut Air Quality.**

This act requires DEP to conduct two studies of air quality issues. First, DEP shall study the feasibility of several issues: 1) adopting the California



tailpipe standards and the effect of their adoption on Connecticut's emissions inspection program; 2) requiring gasoline stations to install Stage II vapor recovery systems; 3) establishing emissions standards for diesel-powered vehicles; and 4) establishing alternative fuel technologies, and evaluation of their efficiency.

Second, in consultation with the DMV, DEP shall review those items currently exempt from repair to bring motor vehicles into compliance with existing air emissions standards. DEP shall submit both reports to the environment committee by February 1, 1990.

**Permit Criteria.** Under this law, DEP shall consider an applicant's compliance with all state and federal environmental laws. If the applicant has violated the terms of a permit, DEP must determine that the applicant is correcting the violation and acting in good faith. Second, DEP shall consider air pollution emissions for all sources on the land where the activity to be permitted is located.

## VI. CONSERVATION AND PRESERVATION

### 1) P.A. 89-388. An Act Concerning Mandatory Boating Education and Certificates of Boating Operation, Prohibiting the Reckless Operation of Vessels, Concerning Noise Levels of Vessels.

**Certification Requirements.** Upon adoption of regulations, after January 1, 1991, no person may operate a vessel which is required to be registered or numbered in this state on state waters without a certificate of boating operation if: 1) the person is a state resident; 2) the person owns real property in this state; or 3) the person is a non-resident who owns a vessel which is required to be registered or numbered in this state.

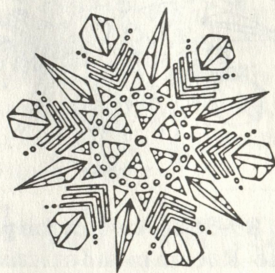
**Courses/Equivalence Exam.** Prior to January 1, 1991, a person may obtain a certificate by: 1) successfully completing a course; 2) successfully completing an equivalence exam; 3) owning a registered or numbered vessel within any of the five years preceding January 1, 1991; or 4) possessing a U.S. Coast Guard vessel operator

license.

To obtain a certificate after January 1, 1991, a person may take either a course in safe boat operation or an equivalency exam, both to be approved by DEP. Any person who violates these provisions shall be fined between \$100 and \$500 for each violation.

**Regulations.** This act requires DEP to establish and regulate courses in safe boating operation. Any fees collected shall be deposited into the boating fund.

This act also requires DEP to adopt regulations establishing a point system such that each conviction for a specific violation shall be assigned a specific number of points against the violator's certificate of boating safety.



**Certificate Suspensions.** Certificates of safe boating operation may be suspended by DEP upon conviction for any violation of this act or any regulation.

**Personal Watercraft.** No person shall operate a personal watercraft after January 1, 1991 unless he has successfully completed a course approved by DEP and has been issued a certificate of personal watercraft operation.

Any willful violation of this section will be fined between \$100 and \$200 for each such violation.

**Reckless Operation.** This act prohibits the operation of a vessel while under the influence of intoxicating liquor or any drug. This act also creates four categories of penalties:

1) **Reckless Operation 1st Degree** is defined as operation at such speed or maneuvering in such a manner as to result in: (1) death or serious physical injury to another person, or (2) damage to property in excess of \$1000. Penalty will be between \$100 and \$1000, imprisonment up to six months, or both.

2) **Reckless Operation 1st**

**Degree While Under The Influence** is defined as operation at such speed or maneuvering in such a manner while under the influence of intoxicating liquor or drugs resulting in: (1) death or serious physical injury to another person, or (2) damage to property in excess of \$1000. Penalty will be between \$500 and \$1000, imprisonment not more than one year, or both.

3) **Reckless Operation 2nd Degree** is defined as operation: (1) at such speed or in such a manner as to endanger life, limb or property of another; (2) while loaded beyond safe carrying capacity having regard for weather and other conditions; (3) while loaded or powered in excess of capacity information label limits; or (4) with altered, defaced or removed capacity information label. Penalty is set at between \$50 and \$200.

4) **Reckless Operation 2nd Degree While Under the Influence** is defined as operation while under the influence of intoxicating liquor or drugs at such a speed or in such a manner as to endanger life, limb or property of another. Penalty is set at between \$250 and \$500, imprisonment of not more than six months, or both.

**Vessel Impoundment.** This act also allows enforcement officials to impound and to arrange for storage of any vessel for reckless operation violations in the first degree and violations of the second degree under the influence.

**Infractions.** Persons convicted of reckless operation while under the influence (1st or 2nd degree) may have their privilege to operate vessels suspended for up to two years, with the notice of suspension transmitted to DEP and DMV. The penalty for operating under suspension is \$200. Penalty for operating vessel or water skiing while under the influence is between \$100 and \$500. The penalty for operation of a vessel or engaging in any activity contrary to DEP regulations is designated as an infraction.

**Vessel Noise.** This act increases the penalties for any violation of Section 15-129 dealing with vessel noise levels. The new penalty for violation



will range between \$100 and \$500.

**2) P.A. 89-224. An Act Establishing a Program for the Protection of Endangered and Threatened Species.**

This act establishes a program for the preservation of endangered and threatened species. DEP will conduct investigations of wildlife and plants to develop information relating to population, distribution and habitat needs. DEP will determine the measures necessary for the continued ability of these species to sustain themselves successfully.

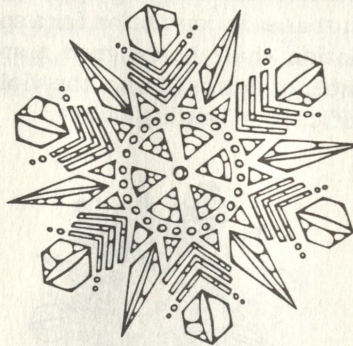
**Regulations.** This act requires DEP to: 1) adopt regulations establishing procedures for determining whether any native species is endangered, threatened, or of special concern; 2) list native wildlife and plants determined to be endangered, threatened or of special concern (within one year of the effective date of this act); 3) adopt regulations to identify, where biologically feasible, essential habitats for the listed endangered and threatened species (within two years of the effective date of this act); 4) establish criteria for the addition or removal from the list of endangered or threatened species or species of special concern, and for the addition or removal of an area identified as an essential habitat for such species; and 5) review the designation of species as endangered, threatened, or of special concern, at least every five years.

In addition, DEP may adopt regulations to treat species not listed as endangered or threatened as if they were in special circumstances.

**Prohibitions.** This act will not prohibit a person from performing any legal activities on his own land that may result in the incidental taking of an endangered or threatened animal or plant species or species of special concern. However, under these provisions, it is unlawful for: 1) any person to wilfully take any endangered or threatened species on or from public property, state waters, or from the property of another without the written permission of the landowner; 2) any person, including the landowner on whose land an endangered or threatened species occurs, to wilfully

take such species for the purpose of selling, offering for sale, transporting for commercial gain or exporting such specimen; and 3) any state agency to destroy or adversely modify essential habitat designated by DEP.

**Penalties.** Any person violating these prohibitions may be penalized up to \$1,000, six months imprisonment, or both, for each offense. Any employer requiring or encouraging employees to violate the above provisions shall be fined \$10,000, imprisoned up to one year, or both.



**3) P.A. 89-368. An Act Implementing the Recommendations of the Task Force on Indian Affairs.**

**State Archeological Preserves.** The Connecticut Historical Commission may examine sites and lands to determine if they are of state or national archeological importance and meet the requirements for listing on the National or State register of historic places.

After designation, no person may conduct any archeological investigation, initiate construction or demolition activities, or undertake any other activity that would endanger the archeological integrity or sacred importance of such preserve.

**Human Skeletal Remains.** This act establishes procedures for the study and proper treatment of human skeletal remains. DEP shall participate in adopting regulations governing the storage, analysis, and reburial. DEP also shall designate state lands for use as sites for reburial of Native American human skeletal remains. Such sites shall be deemed sacred lands and designated as state archeological preserves. Any human remains discovered on and after the effective date of this act shall be reburied.

**Penalties.** This act sets penalties for violations of up to \$5,000 or twice the value of the site or artifact (whichever is greater), imprisonment of up to five years, or both.

**Self-Governance/Trust Agreements.** The state recognizes that the indigenous tribes are self-governing entities possessing powers and duties over tribal members and reservations. These powers include determining tribal membership, leadership, residency and government. Effective October 1, 1990, the governor shall enter into a trust agreement with each willing indigenous Indian tribe. These agreements shall define the powers and duties possessed by the tribe and shall be consistent with the final report of the Indian Affairs Task Force (see below).

**Leadership/Membership.** Each tribal leader shall file a written description of the method of selecting tribal leaders and the process by which tribal leaders exercise their authority with the governor. In addition, beginning March 15, 1990, the tribal leader of each tribe shall file with the governor, an annual copy of the rules for tribal membership and government, a current membership roll and provisions for revocation of membership. Leadership and membership disputes will be resolved by tribal usage and practice.

**Reservations.** This act mandates that each tribe shall exercise all rights incident to ownership on reservation land except the power of alienation. Any reservation held in trust by the state on the effective date of this act shall continue to be held in trust in perpetuity to ensure its availability for future generations of Indians. Each tribe shall determine who may live on reservation land. Any person lawfully residing on a reservation on the effective date of this act may continue to reside on such reservation.

**Indian Affairs Task Force.** This act redefines the composition and responsibilities of the Task Force on Indian Affairs. The Task Force shall report to the General Assembly by February 1, 1990, on the resolution of state government roles and duties to Native Americans and state endorse-



ment or assistance to tribes seeking federal recognition. This act also establishes a Native American Heritage Advisory Council to evaluate and make recommendations on the Native American Heritage to the state archeologist.

**State Museum.** This act names the state museum of natural history as the state repository for all artifacts found and gathered during archeological investigations on state lands. The state museum must establish a collections policy by July 1990.

**4) P.A. 89-351. An Act Concerning the Maximum Fee Which May be Charged by the Commissioner of DEP for the Issuance of Pheasant Tags, and Providing Funds for Various Environmental and Recreational Programs and Projects.**

**Pheasant Tags.** This act raises the maximum fee which DEP may charge for the issuance of pheasant tags from \$5 to \$10.

**Non-Harvested Funding Program.** Under this act, DEP may establish a program for the sale of posters, calendars, publications, and other items.

**Recycling Trust Fund.** This act increases the expenses allocated for the Municipal Solid Waste Recycling Advisory Council from \$50,000 to \$65,000. In addition, \$450,000 annually is allocated to DEP for costs incurred in the administration of the Municipal Solid Waste Recycling program.

**Household Hazardous Wastes.** The funds appropriated to DEP for FY 1988 grants under the chemical disposal day program shall continue to be available for this purpose during FY 1990.

**Appropriations for Parks.** This act appropriates \$177,400 to DEP for the improvement of services at state parks and forests. In addition, \$12,125 is appropriated to the Connecticut River Gateway Commission.

## 6) P.A. 89-321. An Act Concerning Shellfish.

This act transfers the responsibilities for shellfish management from DOHS to DOA. Under this law, the DOA may establish a fee for each type of shellfish license issued.

**Classifications.** This act requires the DOA to classify the coastal waters, shores, and tidal flats for the taking of shellfish as: 1) approved; 2) conditional; 3) restricted; 4) conditionally restricted; and 5) prohibited.

**DEP Enforcement.** This act mandates that conservation officers, special conservation officers, and patrolmen shall enforce these provisions as part of their responsibilities. An additional five conservation officers are funded to handle these increased duties.

**State Shellfish.** This act also designates the eastern oyster as the state shellfish.

This act shall take effect July 1, 1989

# Trailside Botanizer

## Bearberry

by  
Gale W. Carter  
Illustration by  
Pam Carter

Bearberry (*Arctosaphylos uva-ursi*), or kinnikinick as it is sometimes called, is a small trailing shrub which grows to a height of six inches but may on occasion be taller. This native North American plant is a member of the heath family (*Ericaceae*). It forms dense mats in dry sandy areas and in rocky woods.

Bearberry has a reddish bark that easily shreds. The leaves are small, toothless, leathery, and evergreen. They are rounded at the tip, tapering toward the base.

Flowers of bearberry appear from May to July before the young leaves appear. They form clusters of blossoms at the end of the stem. The corolla of each flower is bell-shaped and consists of five fused petals. Flower color varies from white to pink to white with pink tips. There are 10 stamens

and one pistil.

The berry-like fruit with its several nutlets is formed in August and



remains on the stem until November, but may persist through the winter. The generic name consists of two Greek words, *arcto* meaning "bear," and *staphylos* meaning "a bunch of grapes." Its species name is from the Latin *uva* meaning "grape," and *ursi* meaning "bear." In the northern parts of North America, it may well serve as one of the items in the diet of bears.

American Indians and the early settlers had many uses for bearberry. The leaves were used as part of a mixture for smoking. Tobacco and silky dogwood leaves (formerly called red willow) were commonly used. The mixture was called kinnikinick and varied in composition from tribe to tribe and in different parts of the country.

Bearberry was also considered valuable in treating a variety of ailments associated with problems of the kidneys and bladder. It contains the glycoside "arbutin," which has a soothing effect on urinary passages as it is removed by the body.

There are dangers associated with its use, so it is no longer employed as a medicine.

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## Dinosaur State Park

The following programs will take place at Dinosaur State Park in Rocky Hill:

**January 13, 1:00 p.m.** — "Winter Birding." A slide talk and guided nature walk on the park's trails with Eric Thomas, park naturalist.

**January 27, 1:00 p.m.** — "Animal Tracks and Tracking." A slide talk and guided nature walk on the park's trails with Eric Thomas, park naturalist.

**February 17, 1:00 p.m.** — "Winter Trees." A slide talk and guided nature walk on the park's trails with Richard Krueger, park geologist. Participants should dress appropriately for the weather and wear comfortable shoes.

Programs are free with Exhibit Center admission: adults \$1.00, children 6 - 17 years \$.50, children under 5 free.

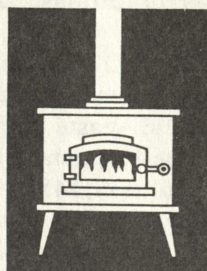
All programs will take place at: Dinosaur State Park, West Street, Rocky Hill, CT 06067, Exit 23 off I-91, (203) 529-8423.

Sponsored by Friends of Dinosaur Park Association, Inc. ■

## PCB Levels

After testing samples of five fish species from the Connecticut River, the DEP and the Department of Health Services have found that only one — carp — showed high enough concentrations of polychlorinated biphenyl (PCB) to require issuing a health advisory.

In 1988, the Massachusetts Department of Environmental Quality found that PCB levels were elevated in catfish from the Connecticut River in Massachusetts. This raised questions about PCB levels in fish from the Connecticut segment of the river. Subsequent sampling and analysis of 13 catfish from the Hartford section of the



river indicated that PCBs in catfish were within acceptable levels.

Samples of white perch, small-mouth bass, largemouth bass, and carp were then obtained and tested for PCBs. Samples were collected during fall 1988 and summer 1989. Eighteen fish of each type were analyzed for PCB. None of the white perch or small-mouth bass which were tested exceeded the U.S. Food and Drug Administration (FDA) limit of 2.0 parts per million (ppm). The most recent testing has shown that PCB levels in largemouth bass from the Connecticut River ranged from 0.1 to 0.5 ppm, with an average concentration of 0.14 ppm. No samples of largemouth bass exceeded the FDA tolerance level for human consumption. The largemouth bass ranged in size from 11.0 to 18.3 inches (0.7 to 4.1 lbs.); the average size was 14.8 inches (2.2 lbs.). PCB levels found in largemouth bass indicate that there is no reason to issue a health advisory for these fish.

PCB levels in carp, however, ranged from 0.3 to 10.5 ppm. The average concentration was 2.4 ppm. Six samples (33 percent) exceeded the FDA tolerance level for human consumption of 2.0 ppm. The carp ranged in size from 19.5 to 28.1 inches (3.4 to 13.9 lbs.).

Due to elevated levels of PCBs, people included in the following categories are advised not to eat carp from the Connecticut River: pregnant or nursing women; women who may become pregnant in the near future; and children under 15 years of age.

Other people who wish to eat carp from the Connecticut River are advised to reduce exposure to PCBs by the following methods: eat smaller fish whenever possible; do not eat skin or

other fatty portions; broil fish so that the fat drips away.

"The health threat posed by PCBs in carp should be put in proper perspective," DEP Commissioner Leslie Carothers said. "Carp are not highly regarded as a food fish in Connecticut and biologists in the Bureau of Fisheries and Wildlife are unaware of any significant fishery for carp on the Connecticut River. Carp were selected for testing because they represent a worst case scenario. They are long-lived, grow to large sizes, and feed at or near the bottom of the river where PCBs tend to settle. Thus they are the most likely fish to accumulate high levels of PCB. This was borne out by the fact that they were the only species tested for which there is reason to issue a health advisory," Carothers added.

PCBs are of concern to state officials because of evidence linking consumption of the chemical to learning disorders and other developmental abnormalities in children of women who were exposed to high levels of PCBs during pregnancy. Also, some laboratory animals fed high levels of PCBs have developed liver cancers and reproductive abnormalities. PCBs accumulate in fatty tissue in both humans and fish and remain there at elevated levels for long periods of time.

"The DEP will continue to monitor the Connecticut River and other places where PCBs or other pollutants are of concern," Carothers said, "and to cooperate with the State Health Department so that citizens may be sure fish and other edible species from Connecticut waters are safe to eat." ■

## Ice Fishing

Chief Robert A. Jones of the DEP Bureau of Fisheries and Wildlife announced two regulation changes which will be in effect for the 1990 ice fishing season. These changes will allow ice fishing on Quonnipaug Lake in Guilford and prohibit ice fishing on Quassapaug Lake in Middlebury and Woodbury.



"Effective January 1, 1990, anglers will be able to ice fish on Quonnapaug Lake under the statewide ice fishing regulations as listed in the 1990 *Connecticut Angler's Guide*," Jones said. "The prohibition against ice fishing was removed at the request of numerous anglers and after the determination that there was no basis for the continued prohibition of ice fishing. In the vast majority of Connecticut lakes where ice fishing is allowed, any problems have proved to be minimal or nonexistent.

"The prohibition on ice fishing on Quassapaug Lake is also effective on January 1, 1991," Jones concluded. "This was instituted at the request of the Quassy Anglers Association and the Friends of Lake Quassapaug, Inc., and after determination that the suggested regulation change would have no significant impact on the general

public as there is little public access to Quassapaug Lake."

## Environmental TV Series

The new television series, *Environment*, produced by Sandra Sprague of WPL-TV in Wallingford, and hosted by Bob Paier, editor of *Connecticut Environment* magazine, may be seen this month on public access channels in Connecticut. Topics include a wide range of environmental subjects, such as alternative energy, the plight of the wolf, winter bird feeding, animal relocation, Long Island Sound, American Indian spirituality, partnership with the landscape, and low level radioactive waste. These programs may be seen at the following times on the following stations:

Wallingford Cable 33: MWF 8:00 p.m.

Telesystems: MWF 8:00 p.m. (Meriden, Southington, Cheshire)

Valley Cable Vision: MWF 8:00 p.m. (Ansonia, Derby, Shelton, Oxford, Beacon Falls, Seymour, Bethany, Naugatuck)

Storer Communications of Clinton: Tues. 5:00 p.m., Fri. 8:00 p.m. (Old Saybrook, Westbrook, Clinton, Killingworth, Deep River, Essex, Chester, Durham, Haddam)

United Cable of Eastern Connecticut: Sundays, 8:00 p.m. (Vernon, Ellington, Tolland, Bolton, Andover, Hebron, Marlborough)

Heritage Cablevision: MWF 8:00 p.m. (Wallingford, North Branford, North Haven, Branford, Guilford, Madison, East Haven)

Please check individual stations for details.

## The Night Sky

### The Wobbling Earth

by  
Francine Jackson

Whenever I'm introduced as an astronomer, invariably the next comment is, "Really? I'm a Pisces!" My next comment is usually one of the following: Either I go into a slight dissertation on the other type of star study (the real science one), or I say, gently, subtly, "No, you're Aquarius," and proceed to tell the listener why. In both cases, the person generally moves on, but the latter type will usually do so with, "I don't care what you say. I'm still a Pisces."

Although it amazes me that people would rather be considered fish than water carriers, the fact of the matter is that the horoscope you read (usually situated on the comics page) for your birthday isn't yours; you should be reading the sign above. To find out why, we must look at our home planet, Earth.

As the Earth revolves around the sun, it also is spinning like a top. The spin results in night and day. However, this rotation isn't straight up and down — instead, it is inclined 23 and one-half degrees with respect to the vertical, more like a top about to fall (except the Earth won't). This deviation from the vertical results in our seasonal change, for as the Earth revolves around the sun, different parts of the Earth receive different amounts of sunlight in the course of a day (24-hour period).

Just as a top wobbles as it slows down, the Earth, too, is wobbling, or precessing; it continues to keep its axis at a 23 and one-half degrees tilt, but the axis itself is rotating. Within the time frame of 25,800 years, the Earth's axis will rotate in a cone of space. For us, it means that the stars will appear to change their positions, although in a human lifetime that change will be insignificant. For example, the North Star, Polaris, will not be at the north point of the sky in several thousand years; however, 26,000 years from now, it will again be about where it is now.

Of great importance to astronomers is the point in the sky called the first point of Aries. We know it more familiarly as the vernal equinox, the point where, when the sun is situated there, spring begins. Two thousand years ago, that point was in the constellation Aries, the Ram. At that time, the start of spring also was the beginning of the new year (notice that Aries is always the first sign listed in every horoscope). But, since then, because of precession, the vernal equinox is now in Pisces. Astrologically, then, all of your signs are off by one. And, in 2597, the vernal equinox will shift into yet another constellation, Aquarius, meaning your horoscope will then be off by two signs. But, fear not. Thanks to the continuing nature of precession, your signs will be correct again, in about a mere 20,000 years.

### Endnote

"Be Dignified and Serious, if possible."

George Ade





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